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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/535,549	05/18/2005	Kazutomo Hasegawa	33857-00011USPX	7266

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EXAMINER	
NEFF, MICHAEL R	

ART UNIT	PAPER NUMBER
2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

TH

Office Action Summary	Application No.	Applicant(s)	
	10/535,549	HASEGAWA, KAZUTOMO	
	Examiner	Art Unit	
	Michael R. Neff	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 May 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 May 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/18/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement filed 5/18/2005 contains a minor error in that the given U. S. Patent document has been given the wrong patent number. The appropriate Patent number for the Bremer reference is 4,464,767 and is referenced as such below. Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 3 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Bremer (US Patent 4,464,767 see IDS).

Re Claim 1, Bremer discloses a multiplexing QAM (Quadrature Amplitude Modulation) apparatus comprising: a QAM unit that generates a plurality of QAM-modulated waves by QAM-modulating a plurality of input data with a common carrier frequency (Figure 3, elements 28, 22, 24 and 26); and

a modulated waves combining unit (38) that generates a multiplexed QAM-modulated wave (per the applicant's disclosure, the output of the addition unit is regarded as a multiplexed signal by the examiner) by combining said plurality of QAM-modulated waves together (Col. 2 lines 20-33),

wherein said modulated waves combining unit gives a gain difference to said plurality of QAM-modulated waves to be combined together, so that symbol positions of said multiplexed QAM-modulated wave combined do not coincide with each other (32, 34, 36; Col. 2 lines 21-33; Figures 4 and 5).

Re Claim 3, Bremer discloses the multiplexing QAM apparatus according to claim 1, wherein said modulated waves combining unit makes a transmitting power of said multiplexed QAM-modulated wave identical to that of another QAM method used on a same transmission line (Col. 1 lines 24-35; Figure 5).

Re Claim 9, Bremer discloses A communication method comprising the steps of: generating a multiplexed QAM-modulated wave using a multiplexing QAM apparatus (Figure 3, elements 22, 24, 26 and 38); and transmitting the generated multiplexed QAM-modulated wave to a communication destination (Col. 2 lines 28-33).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 1, 2 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang (US Patent 6,141,387) in view of Bremer.

Re Claims 1 and 9, Zhang discloses a multiplexing QAM (Quadrature Amplitude Modulation) apparatus and associated method comprising: a QAM unit that generates a plurality of QAM-modulated waves by QAM-modulating a plurality of input data with a common carrier frequency (Figure 2, elements 49, 45, and 47; Col. 3 lines 1-8); and

a modulated waves combining unit that generates a multiplexed QAM-modulated wave by combining said plurality of QAM-modulated waves together (107), but fails to explicitly disclose wherein said modulated waves combining unit gives a gain difference to said plurality of QAM-modulated waves to be combined together, so that symbol positions of said multiplexed QAM-modulated wave combined do not coincide with each other.

This QAM apparatus design is however disclosed by Bremer. Bremer discloses a QAM system wherein the QAM modulated waves combining unit gives a gain difference to said plurality of QAM-modulated waves to be combined together, so that

symbol positions of said multiplexed QAM-modulated wave combined do not coincide with each other (32, 34, 36; Col. 2 lines 21-33; Figure 4).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the signal weighting/gain adjusting aspect of the QAM multiplexing system disclosure of Bremer within the disclosure of Zhang in order to gain the benefit of further enhancing the performance of the QAM system through utilizing the predictable result of the signal weighting to avoid signal overlay and allow for a greater transmission rate.

Re Claim 2, the combined teachings as a whole of Zhang and Bremer disclose the multiplexing QAM apparatus according to claim 1, Zhang further discloses wherein said QAM unit gives a phase difference to at least two of said QAM-modulated waves (45, 47; Col. 1 lines 20-35).

7. **Claims 4 & 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang and Bremer as applied to claim 1 above and further in view of Jasper et al. (herein after Jasper) (US Patent 5,343,499).**

Re Claims 4 and 7, the combined teachings of Zhang and Bremer as a whole disclose the multiplexing QAM apparatus according to claim 1, disclose multiplexing QAM-modulated waves, but fail to explicitly disclose the system further comprising a frequency multiplexing unit that frequency-multiplexes a plurality of multiplexed QAM-modulated waves having different carrier frequencies as recited in claim 4; or a

multiplexing QAM demodulation apparatus comprising: a judgment unit that estimates individual symbol positions which appear in the received multiplexed QAM-modulated wave based on both a symbol position arrangement of said multiplexed QAM-modulated wave and a characteristic of a transmission line, determines a most probable symbol position based on distances between the estimated individual symbol positions and a symbol position of said reception signal, and then determines said plurality of input data from the determined symbol position as recited in claim 7.

This design is however disclosed by Jasper. Jasper discloses a frequency multiplexing unit that frequency-multiplexes a plurality of QAM-modulated waves having different carrier frequencies (Figure 1, Col. 5 lines 27-44; Col. 2 lines 50-68) and the multiplexing QAM demodulation apparatus comprising: a judgment unit (Figure 4, 66, 69) that estimates individual symbol positions which appear in the received multiplexed QAM-modulated wave based on both a symbol position arrangement of said multiplexed QAM-modulated wave and a characteristic of a transmission line, determines a most probable symbol position based on distances between the estimated individual symbol positions and a symbol position of said reception signal, and then determines said plurality of input data from the determined symbol position (Figure 4; Col. 6 line 24-Col. 7 line 8).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the frequency multiplexing unit as disclosed by Jasper as a means to further remove error from the QAM system comprising the QAM-modulating system as disclosed by Zhang and Bremer as a whole in order to gain the

benefit of further organization of the information transmitted over the QAM-modulated waves, allowing for less errors and a higher transfer rate in the system as well as to utilize the demodulation design as disclosed by Jasper in order to gain the benefit of demodulating the multiplexed transmitted signal as provided by the combined disclosures of Zhang, Bremer and Jasper.

8. **Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bremer.**

Re Claim 8, Bremer discloses a multiplexing QAM modulation but fails however to explicitly disclose a demodulation apparatus comprising: a training unit that receives a prescribed training signal transmitted from said multiplexing QAM apparatus during an initialization period of signal transmission, and determines, based on said training signal, by operating with said multiplexing QAM apparatus, at least one parameter among: a QAM value of respective QAM-modulated waves to be differential-gain-multiplexed into said multiplexed QAM-modulated wave; a gain difference between said QAM-modulated waves; and a phase difference between said QAM-modulated waves, so that a proper inter-symbol distance of said multiplexed QAM-modulated wave can be secured after the reception.

However Bremer does disclose a QAM modulating system wherein a sequencer and training generator (20; Col. 1 line 65-Col. 2 line 3) is used to further encode the QAM-modulated signal waves prior to transmission. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made that the

inclusion of this device within the transmitter would then require a device to process this encoding within the receiver, or demodulating end of the system. Therefore the disclosure of Bremer renders obvious the demodulating design of claim 8 wherein the sequencer and training detection/determination device would, per the claimed limitations, provide a proper inter-symbol distance of said multiplexed QAM-modulated wave can be secured after the reception for the demodulation system.

9. **Claims 5 & 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bremer as applied to claim 1 above and further in view of Jasper and Chouly et al. (herein after Chouly) (US Publication 2004/0017857 A1).**

Re Claim 5, Bremer discloses a differential-gain-multiplexed QAM-modulated transmitter, but fails however to explicitly detail a receiver for demodulating the QAM-modulated wave comprising, a probability calculating unit that calculates probabilities that said reception signal corresponds to respective symbol positions, based on variance of symbol positions caused by a transmission line; and a demodulation unit that calculates an expectation value of each of said plurality of differential-gain-multiplexed input data, based on said probabilities that said reception signal corresponds to said respective symbol positions, and estimates said input data based on said expectation value of said input data.

This design is however disclosed by Jasper. Jasper discloses a QAM-demodulation device wherein a demodulation unit that calculates an expectation value of each of said plurality of multiplexed input data (Figure 4, element 66 and 692), and

estimates said input data based on said expectation value of said input data (Figure 4, 66 and 69); however Jasper fails to further disclose wherein the estimates for the demodulation are derived from a probability calculating unit that calculates probabilities that said reception signal corresponds to respective symbol positions, based on variance of symbol positions caused by a transmission line; and based on said probabilities that said reception signal corresponds to said respective symbol positions.

However the use of a probability calculator in a demodulation device is disclosed by Chouly. Chouly discloses a demodulator which can be used with QAM-modulated waves wherein the detection of symbols is based on probability calculation (Abstract; Paragraphs 0017-19; 0046; 0076-0079).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the disclosure of Jasper as being an obvious design for a demodulation unit to coincide with the modulation system of Bremer. Further it would have also been obvious to modify the disclosure of Jasper, which already utilizes a form of estimation in the wave demodulating process to incorporate the probability estimations as disclosed by Chouly in order to gain the benefit of increasing the system efficiency and accuracy by away from error by providing further detailed information for use in the symbol location estimation of the demodulation process.

Re Claim 6, the combined teachings of Jasper, Bremer, and Chouly disclose the multiplexing QAM demodulation apparatus according to claim 5, Jasper further

discloses the system wherein said demodulation unit first estimates said input data having been given a larger modulated wave gain in multiplexing (Col. 7 lines 27-49), and then estimates remaining input data (66, 69) while eliminating improbable symbol positions from the estimated input data (67; Col. 6 lines 46-56).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael R. Neff whose telephone number is (571) 270-1848. The examiner can normally be reached on Monday - Friday 8:00am - 4:30pm EST ALT Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on (571)272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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